



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE GROWTH OF BOYS: DENTITION AND STATURE

By LESLIE SPIER

STUDIES of growth usually give measurements of individuals based on their actual or "chronological" ages and not on their physiological status. The following relations of stature to status as defined by dentition are based on plaster casts of the dental arches and measurements of some three hundred and fifty school-boys of Utuado, Porto Rico, collected by Professor Franz Boas in 1915. The method of treatment was suggested by Professor Boas.

It has been shown¹ that the observed characteristics of curves of growth may be explained as due to variations in the period of development, *i. e.*, to accelerations and retardations. Since the stage of development of a child, at any period, depends on the previous acceleration or retardation of its growth, which affects the body as a whole, it follows that all measurements of the child must vary together; either all values must be increased beyond the average of its age by acceleration or all depressed by retardation. The more rapid the rate of growth, the greater is the effect of variation in period on all the measurements, that is, correlation between all measurements increases during the period of rapid growth and declines during the period of decreasing growth. The variation in period as expressed by a body measurement must be the variation of period at which a particular physiological status is attained. We find, therefore, a correlation between observed physiological status and body measurements. Such a correlation of pubescence to stature, weight, strength of the right hand and to mental development as indicated by school standing has been shown by Crampton,² to head length and width and to width of

¹ Boas, Franz, and Wissler, Clark, "Statistics of Growth," *Report of the Commissioner of Education for 1904* (Washington, 1905), pp. 25-132.

² Crampton, C. Ward, "Physiological Age—A Fundamental Principle," *American Physical Education Review*, vol. XIII (Springfield, Mass., 1908), pp. 141, 214, 268, 345.

face by Boas,¹ and Deaver's data indicates the same relation of pubescence to strength of the forearms and shoulder retractors and to lung capacity.² We should expect a similar correlation of physiological development as indicated by dentition with stature.

Crampton has demonstrated a correlation of dental development with stature and weight. Among 934 New York boys, at a certain age individuals were taller and heavier in proportion to the number of permanent canines and second molars they had erupted.³ In this study the eruption of corresponding upper and lower teeth is considered as a single phenomenon. However, there is usually an interval of about a year between their eruption; therefore, these results are somewhat invalidated. While the present series is smaller, about 350 individuals, the study has been extended to all the deciduous and permanent teeth.

Physiological periods for the Porto Rican boys may be obtained from the data on dentition. The following tables show the number

TABLE I
NUMBER OF DECIDUOUS TEETH PRESENT

Age	Cases	Upper Jaw					Lower Jaw		
		Inner Incisors	Outer Incisors	Canines	First Molars	Second Molars	Canines	First Molars	Second Molars
7	25	7	18	24	22	23	20	19	19
8	44	7	16	31	33	36	24	30	29
9	38	..	3	23	17	24	12	15	17
10	74	..	10	31	19	47	18	28	30
11	65	..	2	16	11	27	9	7	21
12	56	..	..	7	3	10	2	4	10
13	81	..	2	8	3	9	2	4	11
14	84	..	1	..	..	1	..	..	1
15	60	..	..	..	..	..	..	..	..

of deciduous and permanent teeth present among a total of all possible cases of teeth of each kind: teeth, not individuals, are the units. Permanent teeth protruding beyond the gums to any degree

¹ Boas, Franz., "Changes in Bodily Form of Descendants of Immigrants," *Reports of the Immigration Commission* (Washington, 1911), pp. 38, 129-137.

² Deaver, G. Gilbert, "Strength and Lung Capacity in Relation to Pubescence," MS. International Young Men's Christian Association College, Springfield, Mass., 1912.

³ Crampton, pp. 351-355.

are counted as erupted teeth. Any recognizable fragment of a deciduous tooth was counted. Recognition is difficult in plaster casts and mechanical causes operate more freely on the fragments than on permanent teeth, hence, the tables for deciduous teeth are not so smooth as for the permanent.

TABLE II
PERCENTAGES OF DECIDUOUS TEETH PRESENT

Age	Upper Jaw					Lower Jaw		
	Inner Incisors	Outer Incisors	Canines	First Molars	Second Molars	Canines	First Molars	Second Molars
7	29	70	96	89	93	80	77	77
8	16	37	70	76	82	55	67	65
9	..	9	61	46	63	32	40	45
10	..	14	42	26	63	24	38	41
11	..	3	24	17	42	14	11	33
12	..	..	13	5	18	4	7	18
13	..	2	10	4	11	2	5	13
14	..	1	..	..	1	..	..	1
15	..	..	..	..	..	..	..	..

TABLE III
NUMBER OF PERMANENT TEETH PRESENT

Age	Cases	Upper Jaw							Lower Jaw				
		Inner Incisors	Outer Incisors	Canines	First Bicuspids	Second Bicuspids	First Molars	Second Molars	Canines	First Bicuspids	Second Bicuspids	First Molars	Second Molars
7	23	9	3	..	1	..	21	..	4	..	..	19	..
8	44	37	15	9	12	4	44	..	16	5	1	43	..
9	38	38	31	11	21	10	38	3	19	15	8	36	5
10	71	71	57	29	46	23	71	9	50	35	21	70	12
11	65	65	62	40	54	36	65	23	49	51	38	65	31
12	54	54	54	42	51	43	54	34	48	44	38	54	42
13	80	80	80	71	76	70	80	64	78	76	67	80	63
14	84	84	84	81	84	83	84	80	83	83	82	84	80
15	56	56	56	56	56	56	56	53	56	56	52	56	50
16	33	33	33	33	33	32	33	33	33	33	33	33	31
17	23	23	23	23	23	23	23	22	23	23	23	23	23
18	21	21	21	21	21	21	21	20	21	21	21	21	21
19	11	11	11	11	11	11	11	11	11	11	11	11	11

These give, for the loss of the deciduous teeth and the eruption of the permanent teeth, the following average ages and variabilities:

TABLE IV
PERCENTAGES OF PERMANENT TEETH PRESENT

Age	Upper Jaw						Lower Jaw					
	Inner Incisors	Outer Incisors	Canines	First Bicus-pids	Second Bicus-pids	First Molars	Second Molars	Canines	First Bicus-pids	Second Bicus-pids	First Molars	Second Molars
7	46	13	..	4	..	93	..	16	..	..	84	..
8	84	33	20	27	8	100	..	36	11	2	98	..
9	100	82	30	54	28	..	9	50	40	20	95	12
10	..	80	41	65	32	..	12	70	49	29	99	17
11	..	96	62	83	56	..	35	75	79	58	100	47
12	..	100	77	94	79	..	63	88	81	70	..	77
13	..	..	89	95	87	..	80	98	95	84	..	79
14	..	..	97	100	99	..	95	99	99	98	..	95
15	..	..	100	..	100	..	95	100	100	93	..	90
16	..	..	..	..	97	..	100	..	..	100	..	94
17	..	..	..	..	100	..	97	..	..	..	..	100
18	..	..	..	..	..	..	96	..	..	..	..	..
19	..	..	..	..	..	..	100	..	..	..	..	..

TABLE V
LOSS OF THE DECIDUOUS TEETH¹

	Outer Incisors	Canines	First Molars	Second Molars
Upper.....	7.8 ± 1.6	9.5 ± 2.5	9.1 ± 1.9	10.3 ± 2.1
Lower.....	8.4 ± 2.2	8.9 ± 2.2	9.2 ± 3.2	

TABLE VI
ERUPTION OF THE PERMANENT TEETH

	Inner Incisors	Outer Incisors	Canines	First Bicus-pids	Second Bicus-pids	Second Molars
Upper.....	8.5 ± 1.4	10.3 ± 2.2	9.2 ± 2.0 ²	10.7 ± 2.0 ²	12.1 ± 1.7	
Lower.....	6.2 ± 1.5	7.0 ± 1.3	9.0 ± 2.3	9.9 ± 1.8	10.9 ± 2.0	11.4 ± 2.0

¹ Anterior-posterior lengths of permanent and deciduous upper teeth were incidentally obtained:

Permanent inner incisor.....	8.6 ± 0.7 mm.	618 cases.
“ outer “	6.5 ± 0.7	547
“ first bicuspid.....	6.7 ± 0.5	158
“ second “	6.4 ± 0.5	161
Deciduous inner incisor.....	6.1 ± 0.4	16
“ outer “	5.1 ± 0.7	50

² Upper bicuspid appears earlier than the corresponding teeth of the lower jaw in a mixed series of 4,850 boys and girls collected by James and Pitts, *Proceedings Royal Society of Medicine*, vol. 5 (London, 1912), pp. 80-101, and in a similar series of about 4,000 boys and girls by Livy, *British Medical Journal*, vol. 11 (London, 1885), p. 241.

For comparison, we have average ages and variabilities for the eruption of permanent teeth of the upper jaw based on plaster casts collected by Dr. Walter Channing (probably of Boston school children). These averages¹ are based on the number of children having permanent teeth among the total number of children, *e. g.*, a child with one or both permanent canines was counted as a child with permanent canines. Individuals, not teeth, are the units.² The averages are not strictly comparable, since by this method slightly earlier average ages are obtained than by using the teeth as units. We have also separated first and second bicuspid on the same casts.

TABLE VII
NUMBER OF UPPER BICUSPIDS PRESENT

Age	Boys			Girls		
	Cases	First Bicuspid	Second Bicuspid	Cases	First Bicuspid	Second Bicuspid
6	46	1	..	92	4	2
7	60	1	..	76	12	3
8	56	12	6	60	19	9
9	84	33	16	82	41	21
10	62	39	20	65	41	22
11	46	35	25	56	36	29
12	40	32	22	44	36	26
13	24	21	16	34	32	25
14	26	25	20	20	18	16
15	..	..	..	14	14	14

TABLE VIII
PERCENTAGES OF UPPER BICUSPIDS PRESENT

Age	Boys		Girls	
	First Bicuspid	Second Bicuspid	First Bicuspid	Second Bicuspid
6	2	..	4	2
7	2	..	16	4
8	21	11	32	15
9	39	19	50	26
10	63	32	63	34
11	76	54	64	52
12	80	55	82	59
13	87	67	94	74
14	96	77	90	80
15	..	..	100	100

¹ *Statistics of Growth*, p. 34.

² Information from Dr. Clark Wissler.

The average ages and variabilities for the Channing Series are as follows:

TABLE IX

	Inner Incisors	Outer Incisors	Canines	First Bicuspid	Second Bicuspid	Second Molars
Boys	7.5 $\pm$ 1.4	9.5 $\pm$ 2.1	11.2 $\pm$ 1.4	9.4 $\pm$ 2.2	11.4 $\pm$ 2.9	13.2 $\pm$ 2.0
Girls	7.0 $\pm$ 1.6	8.9 $\pm$ 2.1	11.3 $\pm$ 1.0	9.5 $\pm$ 2.5	11.2 $\pm$ 2.9	12.8 $\pm$ 1.6

As these figures stand, the Porto Rican boys appear to erupt their teeth as much as a year in advance of the Boston boys. However, the meaning of this difference is obscure, since Channing and Wissler found that a group of feeble-minded children erupted their canines and second molars a corresponding period in advance of the same Boston boys.¹

TABLE X

	Boys	Girls
Canines	10.7 $\pm$ 1.4	10.0 $\pm$ 1.7
Second molars	10.9 $\pm$ 1.9	11.8 $\pm$ 0.9

If there is a correlation between physiological status and body measurements, then, at a certain age, those individuals accelerated beyond the average dental stage of their age should show a greater average stature than the remaining individuals. For example, eight-year-old boys with permanent upper canines are more developed than their age-mates who lack these teeth; as accelerated individuals, the group with canines should have an average stature greater than that of the group without canines. Similarly, a group lacking deciduous canines should be taller than a group of the same age with these teeth.

In tables XI and XII are given the average statures and variabilities of boys separated on the basis of the presence and absence of the deciduous teeth and the absence and presence of the permanent teeth, tooth by tooth.

¹ Channing, Walter, and Wissler, Clark: "The Hard Palate in Normal and Feeble-Minded Individuals," *Anthropological Papers, American Museum of Natural History*, vol. I (New York, 1908), pp. 316-319.

TABLE XI
STATURE OF BOYS WITH DECIDUOUS TEETH PRESENT AND ABSENT
(Statures in millimeters)
Upper Jaw

Age	Outer Incisors		Canines		First Molars		Second Molars	
	Present	Absent	Present	Absent	Present	Absent	Present	Absent
7	1141 ± 48	1139 ± 69	.....	.....	.....	.....	.....	.....
8	1166 ± 35	1189 ± 61	1182 ± 53	1173 ± 57	1177 ± 41	1187 ± 85	1181 ± 49	1170 ± 74
9	.....	.....	1245 ± 40	1268 ± 48	1243 ± 39	1263 ± 47	1241 ± 44	1276 ± 36
10	1266 ± 103	1276 ± 60	1242 ± 59	1299 ± 65	1247 ± 40	1284 ± 72	1274 ± 63	1275 ± 75
11	.....	.....	1263 ± 47	1325 ± 53	1277 ± 74	1317 ± 48	1296 ± 65	1321 ± 50
12	.....	.....	1336 ± 66	1389 ± 75	.....	.....	1356 ± 86	1386 ± 72
13	.....	.....	1308 ± 84	1394 ± 77	.....	.....	1294 ± 109	1397 ± 71

Lower Jaw

8	1195 ± 57	1155 ± 44	1195 ± 57	1155 ± 44	1182 ± 56	1168 ± 48	1178 ± 58	1176 ± 47
9	1241 ± 48	1200 ± 48	1241 ± 48	1200 ± 48	1241 ± 32	1261 ± 53	1252 ± 44	1253 ± 49
10	.....	.....	1253 ± 50	1281 ± 72	1242 ± 54	1294 ± 69	1260 ± 71	1284 ± 62
11	.....	.....	1235 ± 43	1317 ± 51	1265 ± 75	1311 ± 53	1281 ± 61	1319 ± 50
12	.....	.....	.....	.....	.....	.....	1383 ± 83	1382 ± 78
13	.....	.....	.....	.....	.....	.....	1307 ± 102	1398 ± 270

TABLE XII
STATURE OF BOYS WITH PERMANENT TEETH ABSENT AND PRESENT
Upper Jaw

Age	Outer Incisors		Canines		First Bicuspids		Second Bicuspids		Second Molars	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
8	1165 ± 41	1213 ± 64	1188 ± 52	1145 ± 49	1176 ± 41	1186 ± 81	1181 ± 45	1157 ± 95	.....	.....
9	1249 ± 23	1254 ± 48	1257 ± 42	1260 ± 47	1243 ± 39	1263 ± 47	1242 ± 41	1284 ± 36	.....	.....
10	1264 ± 78	1279 ± 63	1251 ± 58	1308 ± 68	1248 ± 57	1289 ± 69	1270 ± 48	1285 ± 71	1269 ± 61	1342 ± 69
11	.....	.....	1284 ± 51	1326 ± 57	1280 ± 80	1317 ± 51	1297 ± 65	1320 ± 51	1305 ± 60	1321 ± 53
12	.....	.....	1341 ± 60	1409 ± 64	.....	.....	1356 ± 86	1386 ± 72	1352 ± 62	1397 ± 77
13	.....	.....	1317 ± 82	1394 ± 77	.....	.....	1334 ± 134	1395 ± 67	1338 ± 103	1400 ± 68

Lower Jaw

Age	Outer Incisors		Canines		First Bicuspids		Second Bicuspids		Second Molars	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
7	1109 ± 26	1174 ± 60	.....	.....	.....	.....	.....	.....	.....	.....
8	1173 ± 40	1179 ± 57	1187 ± 57	1159 ± 48	.....	.....	.....	.....	.....	.....
9	.....	.....	1245 ± 50	1264 ± 45	.....	.....	.....	.....	.....	.....
10	.....	.....	1248 ± 48	1285 ± 73	1238 ± 36	1267 ± 51	1249 ± 41	1265 ± 50	.....	.....
11	.....	.....	1266 ± 55	1317 ± 52	1249 ± 57	1293 ± 70	1262 ± 62	1305 ± 76	1266 ± 56	1335 ± 70
12	.....	.....	1362 ± 74	1385 ± 79	1292 ± 65	1310 ± 54	1287 ± 61	1321 ± 49	1292 ± 58	1323 ± 51
13	.....	.....	.....	.....	1353 ± 81	1387 ± 78	1352 ± 73	1392 ± 78	1335 ± 76	1394 ± 75
					.....	.....	1314 ± 96	1400 ± 70	1343 ± 79	1396 ± 80

TABLE XIII
STATURE OF BOYS ON THE BASIS OF ALL TEETH

Age	Upper Jaw				Lower Jaw				Upper and Lower Jaws	
	Permanent		Deciduous		Permanent and Deciduous		Deciduous		Permanent and Deciduous	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
7	1142 ± 51	1147 ± 61	1146 ± 52	1134 ± 56	1144 ± 51	1141 ± 59	1138 ± 52	1154 ± 55	1143 ± 54	1140 ± 53
8	1178 ± 47	1181 ± 60	1177 ± 46	1182 ± 61	1177 ± 46	1182 ± 60	1181 ± 51	1174 ± 54	1181 ± 52	1175 ± 53
9	1249 ± 40	1259 ± 46	1243 ± 40	1260 ± 45	1247 ± 40	1260 ± 45	1248 ± 42	1256 ± 45	1249 ± 42	1257 ± 45
10	1262 ± 63	1283 ± 68	1259 ± 64	1280 ± 68	1261 ± 63	1282 ± 68	1259 ± 57	1282 ± 69	1257 ± 58	1281 ± 69
11	1294 ± 61	1310 ± 55	1281 ± 63	1317 ± 54	1290 ± 62	1316 ± 54	1286 ± 59	1313 ± 55	1267 ± 61	1313 ± 54
12	1353 ± 60	1387 ± 73	1357 ± 71	1383 ± 73	1354 ± 60	1385 ± 73	1349 ± 73	1385 ± 75	1319 ± 74	1382 ± 74
13	1324 ± 105	1391 ± 76	1308 ± 93	1396 ± 75	1319 ± 100	1393 ± 76	1314 ± 88	1390 ± 78	1251 ± 45	1399 ± 74
									1292 ± 80	1394 ± 76
									1286 ± 61	1315 ± 54
									1384 ± 71	1384 ± 74
									1303 ± 90	1394 ± 76

These data, together with a few cases referring to teeth not tabulated, are averaged below for corresponding values for the upper and lower jaws separately and finally together (table XIII). This is in effect simply weighting the stature of each individual according to his dental pattern.

After the ninth year the average statures of the two groups differ, the absolute difference increasing to the fourteenth year (see particularly the last two columns). These values show that there is a functional relation between stature and physiological status as defined by dentition.

For comparison, the upper bicuspid of boys and girls of the Channing series have been treated in the same manner with regard to stature and weight (tables XIV and XV).

TABLE XIV
STATURE OF CHILDREN WITH UPPER BICUSPIDS ABSENT AND PRESENT

Age	Boys				Girls			
	First Bicuspid		Second Bicuspid		First Bicuspid		Second Bicuspid	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present
7	.....	.....	.....	.....	1162 ± 44	1200 ± 46	.....	.....
8	1229 ± 47	1244 ± 73	1232 ± 53	1231 ± 60	1216 ± 44	1216 ± 43	1217 ± 44	1214 ± 44
9	1267 ± 59	1282 ± 54	1297 ± 66	1286 ± 47	1250 ± 55	1292 ± 84	1264 ± 61	1292 ± 107
10	1334 ± 68	1319 ± 62	1310 ± 59	1339 ± 65	1296 ± 67	1318 ± 64	1311 ± 68	1312 ± 63
11	1373 ± 73	1319 ± 91	1348 ± 69	1319 ± 103	1323 ± 68	1351 ± 75	1329 ± 80	1351 ± 67
12	1374 ± 74	1399 ± 84	1381 ± 83	1405 ± 86	1335 ± 56	1423 ± 73	1374 ± 80	1430 ± 67
13	.....	.....	1438 ± 122	1433 ± 89	.....	.....	1448 ± 118	1527 ± 56

This smaller series gives affirmative results for both statures and weights.

TABLE XV
WEIGHT OF CHILDREN WITH UPPER BICUSPIDS ABSENT AND PRESENT
(Weight in Pounds Avoirdupois)

Age	Boys				Girls			
	First Bicuspid		Second Bicuspid		First Bicuspid		Second Bicuspid	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present
7	.....	.....	.....	.....	54.7 ± 7.1	58.2 ± 6.0	.....	.....
8	54.8 ± 7.4	58.7 ± 5.2	55.3 ± 7.2	57.8 ± 6.2	56.0 ± 7.7	54.4 ± 5.2	56.1 ± 7.1	52.3 ± 4.6
9	60.0 ± 9.6	58.8 ± 7.6	57.7 ± 10.3	60.8 ± 8.2	54.9 ± 5.9	60.2 ± 10.0	56.1 ± 7.2	61.5 ± 11.1
10	61.9 ± 6.9	62.6 ± 7.5	60.8 ± 6.4	65.7 ± 7.9	62.0 ± 8.8	63.2 ± 8.9	62.9 ± 9.1	61.4 ± 8.5
11	68.8 ± 14.3	68.6 ± 7.3	66.2 ± 11.3	70.8 ± 6.6	65.0 ± 8.1	64.7 ± 7.7	64.6 ± 7.9	65.1 ± 8.1
12	66.4 ± 11.7	71.5 ± 12.4	67.7 ± 3.0	73.2 ± 12.3	65.2 ± 10.9	77.3 ± 12.7	73.2 ± 16.1	76.0 ± 10.8
13	.....	.....	76.3 ± 9.1	79.1 ± 18.4	.....	.....	89.3 ± 22.3	89.5 ± 20.8

Having shown that variations in stature correspond to variations in the period of physiological development, we can obtain an insight into the character of the variations in period by considering each measurement as corresponding to the age to which it would belong according to the table of average statures for all boys (table xvi).

TABLE XVI
STATURES AND WEIGHTS OF ALL BOYS AND GIRLS

Age	Porto Rican Boys		Channing Series					
			Boys			Girls		
	Cases	Stature	Cases	Stature	Weight	Cases	Stature	Weight
6	..	.....	23	1131±38	52.1± 8.5	46	1126±43	51.3± 6.5
7	14	1144± 56	30	1165±60	53.6± 7.5	39	1168±45	55.3± 7.0
8	26	1179± 53	27	1232±53	55.6± 7.0	31	1216±43	55.5± 7.0
9	23	1254± 45	40	1273±57	59.5± 8.7	42	1271±73	57.5± 8.6
10	39	1275± 68	33	1323±63	62.3± 7.3	34	1310±65	62.8± 8.8
11	37	1311± 57	21	1332±89	68.7± 9.2	30	1340±73	64.9± 7.9
12	30	1381± 75	21	1394±81	70.7±12.3	22	1407±77	75.1±13.0
13	42	1386± 82	12	1434±98	78.2±15.8	16	1506±97	89.5±20.8
14	47	1468± 90	12	1552±85	88.1± 3.0	9	1541±99	99.9±30.7
15	32	1519±102	..	.....	.....	7	1599±53	108.0± 4.1
16	18	1571± 66	..	.....	.....	..	.....	.....
17	14	1602± 62	..	.....	.....	..	.....	.....
18	12	1627± 87	..	.....	.....	..	.....	.....
19	6	1620± 45	..	.....	.....	..	.....	.....

Confining our attention to the final values for Porto Rican boys (last two columns of table xiii), we can interpolate in this table for example for 1303 for stature and find 10.8 as the age for the corresponding average stature.

TABLE XVII

Age	Permanent Absent	Permanent Present
	Deciduous Present	Deciduous Absent
7.....	7.0	7.0
8.....	8.0	8.0
9.....	8.9	9.3
10.....	9.3	10.2
11.....	10.3	11.2
12.....	11.5	12.7
13.....	10.8	13.1

These ages obtained by dentition and stature probably differ more from the corresponding chronological ages than would ages obtained on the basis of stature alone.

At the beginning of the period of rapid increase in the rate of growth, the accelerated individuals must be growing at a higher rate than the retarded individuals of the same chronological age but who have not yet entered into the period of rapid growth. Conversely, at the end of the period of rapid growth, the accelerated individuals must grow at a slower rate than the retarded. Consequently, at the beginning of the period, accelerated individuals must vary more than retarded individuals from the average of their age and less at the end of the same period. We have compared below the variabilities of the retarded and accelerated groups of each age.

TABLE XVIII

Age	Retarded Group	Accelerated Group	Difference
7	52	56	+ 4
8	49	56	+ 7
9	41	45	+ 4
10	61	68	+ 7
11	61	54	- 7
12	71	74	+ 3
13	90	76	-14

While the results are not marked, the accelerated group varies more than the retarded group at the beginning of the period of rapid increase of the rate of growth, but less at the end of the same period. The converse holds true for the retarded group. From another point of view the increased variabilities in stature for both accelerated and retarded groups may be an expression of a different rate of development from that of dentition. If this is so, the greater the degree of acceleration or retardation of dental development, the greater will be the variations in stature.¹

These data show that there is a marked functional relation between stature and stage of dental development. Variations in stature, aside from such as are due to heredity and perhaps to other causes, are then expressions of variations in the period at which certain stages of development are reached.

AMERICAN MUSEUM OF NATURAL HISTORY,
NEW YORK CITY

¹ Boas, Franz, "The Growth of Children," *Science*, N. S., vol. XXXVI, no. 937, p. 817.